



A Research Bulletin

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Missouri Leads the Way in Optimizing Snow Removal

Business Issue

Missouri taxpayers are accustomed to having roads ready for travel even during the harshest winter storm. However, winter storm fights are costly in materials and manpower. MoDOT is committed to using innovative approaches to meet customer expectations at the best value.

Approach

With 34 TowPlows now in its fleet, the Missouri Department of Transportation leads the nation in wide plowing technology. During winter storms in Missouri, 34 specially trained MoDOT snowplow drivers do the work of at least 68 drivers in 68 trucks.



The concept of wider plowing is not new to Missouri. Since 1997, MoDOT has added roughly 500 14-foot plows to improve the efficiency of its snow plow fleet. The TowPlow is yet another tool to help improve that efficiency. The TowPlow is a steerable plow that is pulled behind a tandem axle snowplow truck and is able to swing out to one side, which doubles the plow width of a tandem-axle snowplow truck.

Following the development of the technology in Missouri, the TowPlow was first used in Kansas City, Missouri in January 2005. It didn't take long for transportation engineers and maintenance professionals to recognize the benefits of improving the efficiency of the typical snowplow operation.



As many in the transportation field acknowledge, developing a "unit cost" of removing snow can be as difficult as predicting the snow itself. There are many factors that affect speed, fuel efficiency, material usage and labor costs. In order to understand the benefits of the TowPlow, it is best to look at some common snow plowing practices in Missouri.

Approach (cont'd)

Urban Gang Plowing

Gang plowing is the practice of plowing multiple-lane roadways (up to five or six lanes in one direction) with several snowplow trucks. These trucks are staggered across the roadway; all plowing snow to one direction, usually to the right. In St. Louis and Kansas City, it was common to see six to 10 snowplow trucks used in this configuration to clear these routes. While this was the best practice with available equipment, the incorporation of TowPlows in these gangs has had a direct impact on the efficiency of this operation.

Consider a gang-plowing configuration of seven snowplow trucks with 14-foot wide front plows. Each single truck could clear a path of roughly 12 feet. Usually an overlap of trucks is required to clear the snow completely without leaving some residual snow off the left edge of the plow. This overlap brings the effective width of some of the trucks down to 10.5 feet. This configuration can clear a total of 75 feet. The first truck clears 12 feet and all the rest clear 10.5 feet each. This configuration can clear five 12-foot lanes plus a four-foot inside shoulder and a 10-foot outside shoulder.

A snowplow truck equipped with a 14-foot front plow and a TowPlow can clear a path 25-feet wide. In gang-plowing operations, two trucks with TowPlows can directly replace four trucks. In this configuration the use of two TowPlows eliminates the need for two trucks and two operators. A **28.6 percent reduction in labor and fuel cost** is realized in this application.

Rural Divided Four-lane Highways

Many snowplowing operations are done with trucks equipped with 12-foot snowplows. For a divided highway with a four-foot inside shoulder and a 10-foot outside shoulder, this requires five passes of a single truck, because the clearing width is roughly 8.5 feet. In Missouri, it is common to use 14-foot plows on these types of facilities, which still requires

four passes of a single truck to clear both the driving and passing lanes along with both shoulders. The path cleared by the 14-foot plow is 12 feet.

Of the 34 TowPlows in MoDOT's fleet, one can be deployed to the lefthand side of the snowplow truck. All others are deployed to the right. With this TowPlow, the four-lane highway can be cleared with two trucks, one pass each. One truck with the lefthand TowPlow can clear the passing lane and inside shoulder, while the other truck can clear the driving lane and the outside shoulder. Similar to the gang-plowing example, the same amount of clearing can be done with half the trucks and operators, saving **50 percent on labor and fuel costs** for this operation.

Other applications

In Missouri, TowPlows are also used in a variety of lower-speed urban multilane roadways some of which include center left-turn lanes. As more of the district maintenance staff and management gain experience with the TowPlows, it will be used in more applications.